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## DRAWINGS ATTACHED

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(54) A MACHINE CLOTH FOR THE PAPER MAKING, THE CELLULOSE, THE ASBESTOS-CEMENT-INDUSTRIES AND SIMILAR INDUSTRIES AND CLOTH FOR FILTERING PURPOSES AT SAID AND OTHER INDUSTRIES

(71) We, NORDISKA MASKINFILT AKTIEBOLAGET, a company organized under the Laws of Sweden, of Halmstad, Sweden, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention has reference to a machine cloth comprising yarns of synthetic material and alternatively in blend with wool, this cloth being woven endless or jointed to become endless. The cloth is intended in particular to be used as a forming sieve or as a machine cloth in the wet or drying compartments of papermaker's machines, cellulose-machines, asbestos-cement-machines or similar machines. The machine cloth may also be used for filtering purposes in combination with said machines and for other purposes.

The main feature of the invention is that the weft layer of the machine cloth which in position of operation is directed towards the material to be dewatered comprises yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns, or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool, while in a lower weft layer those threads which are parallel with said yarns and warp yarns interconnecting said two layers comprise monofilaments. A fabric so shaped of double layers (or several layers) gives in operation *inter alia* the following advantages. The fabric will be practically incompressible which means that when passing the press nip between two rollers, e.g. in the wet compartment of a paper maker's machine, it retains substantially its cross section. The lower fabric layer, which is composed completely of

monofilament yarns, is able to hold considerable amounts of water. The outer layer on the other hand which is composed of yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool, will be rather smooth and free from marking, i.e. there will occur no disfiguring markings on the web to be dewatered. Nevertheless, the machine cloth will be sufficiently open to permit transportation of water from the web, e.g. the paper web, the cellulose web or the asbestos-cement web, down to the lower layer of the machine cloth from which the water then can be removed by intermediary of known means, such as suction boxes or blowing means. So as alternatively to reduce the openness in the machine cloth a third layer can be interwoven between said two layers, this third layer comprising yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool. For the reason that the yarns of the lower layer comprise monofilaments, the layer of the machine cloth which runs over tension and delinking rollers will be very wear resistant and will get an increased life length.

In case even less marking of the paper web is desirable, it is according to the invention advisable to use for the upper layer yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool, which are raised or napped.

According to another embodiment which gives almost complete freedom from marking which may be necessary, particularly

when forming, it is possible to needle into the outer layer of the machine cloth a batt comprising wool and/or synthetic fibres. The wool may be mixed with synthetic fibres of a melting point below the melting point of the other fibres. After the needling of the batt, the machine cloth is heated at a later treatment to a temperature above the melting point of the fibres in question, preferably simultaneously with a compression of the batt layer.

Such a machine cloth is given a very smooth outer layer which nevertheless is sufficiently open to permit passage of water from the wet paper web to the lower layer of the machine cloth. The filtering properties will be very good at the use of such a product.

The invention will in the following be elucidated in more detail with reference to the accompanying diagrammatic drawings. In the drawings:—

Fig. 1 is a side elevation of an embodiment of the wet pressing department of a paper machine,

Fig. 2 is a side elevation of a so called uni-press of a paper maker's machine,

Fig. 3 shows on an enlarged scale a cross section on the line III—III in Fig. 1 of a machine cloth with a paper web resting thereon, and

Fig. 4 shows a section similar to the one in Fig. 3 but according to another embodiment.

The machine cloth shown in Fig. 3 has two systems and is woven or jointed endlessly. The threads 1 and 2, extending in the machine direction, or perpendicularly thereto comprise the weft of the fabric while the yarns 3 interwoven with said weft yarns 1 and 2 comprise the warp. Thus, the fabric comprises two layers, viz. one outer weft layer 5 facing the paper web 4 to be de-watered and a lower weft layer 6 facing away from the web 4. The yarns 1 of the outer layer 5 comprise threads spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns, or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool, whilst the other yarns comprise monofilaments. The yarns 1 of the outer layer 5 may comprise e.g. synthetic staple fibres of 3—15 deniers and a length of about 90 millimetres. The yarns 2 may have a diameter of e.g. 0.35 millimetres and the yarns 3 may have a diameter of 0.5 millimetres. The material in the yarns 1, 2, and 3 may be e.g. polyamide, polyester or polypropylene separately or in blends. The yarns 1 may also comprise a blend of wool and any other fibres.

It is probably obvious from Fig. 3 that the outer layer 5 due to the yarns 1 spun of (a) synthetic staple fibres and/or wool, or (b) multifilament yarns or (c) blends of the

multifilament yarns with the synthetic staple fibres and/or wool, will be sufficiently smooth and dense not to "mark" the paper web 4 when it passes the press nip between a pair of press rollers. The outer layer 5 also forms an excellent support for the paper web such that the pressure will be evenly distributed over the paper. In spite of the rather smooth surface on the outer layer 5 of the machine cloth, the layer 5 will be sufficiently open for water passage from the paper web 4 to the lower layer 6 of the machine cloth. Alternatively, it is possible in order to reduce the openness to arrange a third layer 5<sup>1</sup> between the layers 5 and 6 as shown in Figs. 3 and 4, the yarns in this layer 5<sup>1</sup> comprising yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns, or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool.

If there is desired an even smoother surface on the outer layer 5, the yarns 1, spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns, or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool, may be napped or raised.

According to another embodiment of the invention it is possible as already mentioned to needle a batt into the outer layer 5 of the machine cloth. The batt 7 may comprise a blend of wool fibres and synthetic fibres. It might be composed completely of synthetic fibres. In a way known per se the batt may also comprise melt fibres, i.e. synthetic fibres which have a lower melt point than the rest of the fibres in the batt. After the needling of the batt into the outer layer 5, the batt is heated, e.g. by means of hot air jets, to a temperature above the plastification point of these fibres whereby these fibres at points melt together with the rest of the fibres in the batt at the contact points of the fibres. At the same time the machine cloth should be exposed to an evenly distributed pressure from above which gives a certain remaining compression of the batt layer 7. Due to the melting together of the fibres only at points of the fibres in the batt layer 7, the machine cloth retains its openness. The method to attach, by means of needling, a batt with or without a subsequent heating and a certain compression gives a smooth upper surface.

In Fig. 1 there is shown a machine cloth 8 according to the invention being either woven endless or jointed so as to become endless and used in the wet pressing compartment of a paper maker's machine. It runs over a rotated roller 9 and runs also over a direction roller 10 and a tensioning roller 11. Reference numeral 12 denotes a suction box and reference numeral 13 denotes a press roller cooperating with the roller 9.

When the paper web 4 passes the press nip between the rollers 9 and 13, the water is pressed out of the paper web and passes the outer layer 5 of the machine cloth and down into the lower layer 6 so as to be sucked out of the layer 6 where the machine cloth passes the suction box 12.

In Fig. 2 there is shown a Fourdrinier sieve 14 in a paper maker's machine running over a couch roller 15 and a tensioning roller 16. The paper web 4 is removed by means of a machine cloth 8 according to the invention which runs over a roller 18 provided with a suction device 17 and further over a directing roller 19 and a tensioning roller 20. A smooth press roller 21 co-operates with the roller 18 and the paper web is removed from the press roller 21 at 22. There is also in the press nip between the rollers 18 and 21 obtained a very good dewatering effect by means of the machine cloth 8 according to the invention.

The invention has been described in the foregoing for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims.

From the above, it will be seen that the properties of yarns 1, 2 and 3 are as follows:

30 Yarn 1

- (a) always a weft yarn,
- (b) the yarn normally extends in the longitudinal direction of the machine but may also extend in the transverse direction thereof as seen from the position of use of the machine,
- (c) always a yarn spun of synthetic staple fibres and/or wool or multifilament yarns or blends thereof.

40 Yarn 2

- (a) always a weft yarn,
- (b) see point (b) concerning yarn 1,
- (c) always a monofilament yarn.

45 Yarn 3

- (a) always a warp yarn,
- (b) the yarn normally extends in the transverse direction of the machine but may also extend in the longitudinal direction thereof as seen from the position of use of the cloth,
- (c) always a monofilament yarn.

WHAT WE CLAIM IS:—

1. A machine cloth intended to be used as a forming sieve or a machine felt in the wet or drying department of paper machines, cellulose machines, asbestos-cement machines and similar machines or as cloth for filtering purposes in these kinds of industries and other industries and woven from threads of a textile material and being woven or jointed to endless shape, characterised in that the yarns in the outer weft layer of the machine cloth facing the material to be dewatered comprise yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns, or (c) blends of the multifilament yarns with the synthetic staple fibres and/or wool, whilst in a lower weft layer those threads which are parallel with said yarns and warp yarns interconnecting said layers comprise monofilaments.

2. A machine cloth as claimed in claim 1, characterised in that the yarns in the outer layer are napped.

3. A machine cloth as claimed in claim 1 or 2, characterised in that in the outer layer there is needed a batt comprising wool and/or synthetic fibres.

4. A machine cloth as claimed in any of the preceding claims, characterised in that a third layer is interwoven between the two other layers which third layer comprises yarns spun of (a) synthetic staple fibres and/or wool, (b) multifilament yarns, or (c) blends of the multifilament yarns with the synthetic fibres and/or wool, these arrangements being intended to reduce the openness of the cloth.

5. A machine cloth as claimed in any of the preceding claims, characterised in that there is in the batt mixed synthetic fibres with a melting point lower than the melting point of the other fibres and that the machine cloth after the needling is heated to a temperature above the melting point in question preferably while simultaneously compressing the batt.

6. A machine cloth as hereinbefore described and shown in the accompanying drawings.

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Fig.1

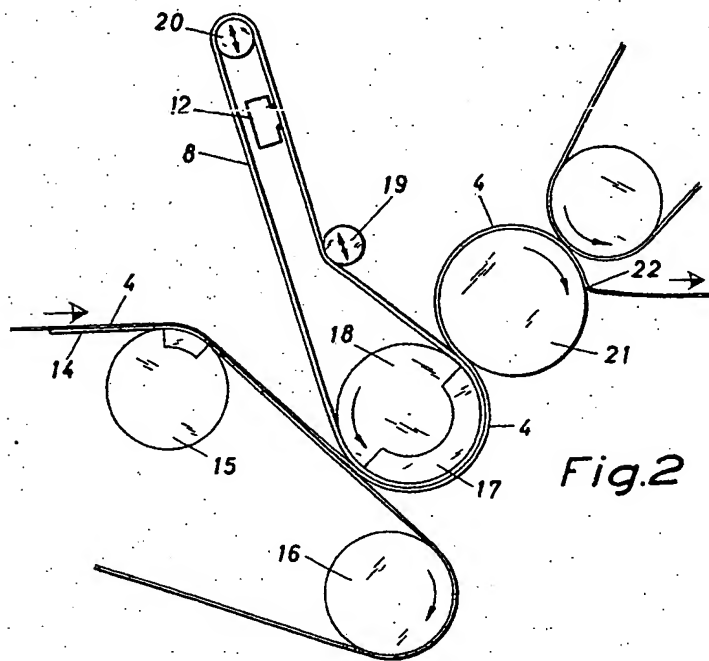
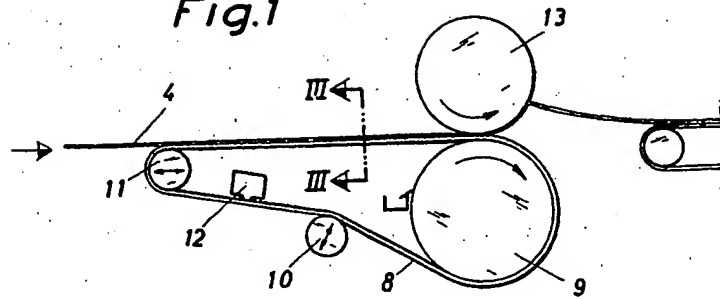


Fig.2

Fig.3

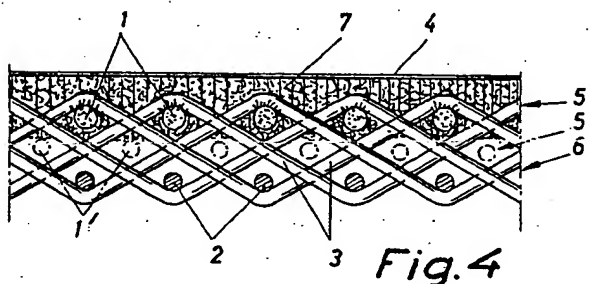
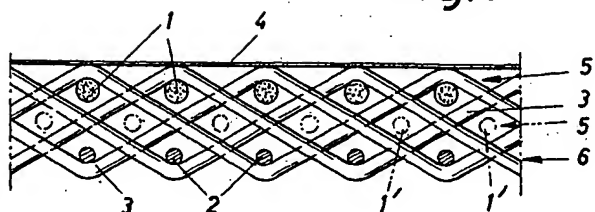


Fig.4